

**IN THE CLAIMS**

Please amend the claims as indicated below.

What is claimed is:

- 1 1. (currently amended) A method for ~~determining~~ estimating a parameter of interest  
2 of an earth formation with a logging tool having a nuclear radiation source for  
3 ~~irradiating said earth formation~~ and a nuclear radiation detector spaced apart from  
4 the nuclear radiation source ~~for making measurements resulting from interaction~~  
5 ~~of said irradiation with said earth formation~~, the method comprising:  
6 (a) activating the nuclear radiation source;  
7 (a) (b) defining a starting time for a processing time window at which ~~said~~  
8 measurements made by the nuclear radiation detector are responsive  
9 primarily to ~~said the~~ parameter of interest;  
10 (b) (c) defining an ending time for ~~said the~~ processing time window at which ~~said~~  
11 the measurements are substantially uncontaminated by noise; and  
12 (e)(d) analyzing ~~said the~~ measurements within ~~said the~~ processing time window  
13 for ~~determining~~ estimating the parameter of interest.  
14
- 1 2. (currently amended) The method of claim 1 wherein defining ~~said the start~~ starting  
2 time further comprises determining a time at which a value of ~~said the~~  
3 measurements has a predetermined relationship to a ~~determined~~ an estimated

4 value of a parameter of interest at an ending time of a processing time window for  
5 an earlier operation of said source.

6

1 3. (currently amended) The method of claim ~~2~~ 1 wherein ~~said~~ the nuclear radiation  
2 source comprises a pulsed neutron source.

3

1 4. (currently amended) The method of claim ~~2~~ 1 wherein ~~said~~ the measurements  
2 made by the nuclear radiation detector comprise gamma ray measurements.

3

1 5. (currently amended) The method of claim 3 wherein ~~said~~ the parameter of interest  
2 ~~further~~ comprises at least one of (i) a thermal neutron capture cross section of said  
3 the earth formation, (ii) porosity, (iii) formation water salinity, and, (iv) the  
4 quantity and type of hydrocarbons contained in pore spaces.

5

1 6. canceled

2

1 7. (currently amended) The method of claim 2 wherein said relationship is of the  
2 form

3 
$$istr = K / \Sigma$$

4 where *istr* is the start time of a window, *K* is a constant, and  $\Sigma$  is a capture cross  
5 section at ~~said~~ the ending time of ~~said~~ the processing time window for ~~said~~ the  
6 earlier ~~pulsing~~ operation of ~~said~~ the source.

7

1 8. (currently amended) The method of claim 1 wherein defining ~~said time window~~  
2 ~~ending time~~ the ending time of the processing window further comprises forming  
3 a running sum of count rates starting at ~~said~~ the starting time.

4

1 9. (currently amended) The method of claim 8 wherein defining ~~said time window~~  
2 ~~ending time~~ the ending time of the processing window further comprises  
3 determining a time at which a count rate has a predetermined relation to said  
4 running sum.

5

1 10. (currently amended) The method of claim 1 further comprising partitioning ~~said~~  
2 the processing time window into a plurality of channels (time intervals) having a  
3 length depending upon said ~~the start~~ starting time.

4

1 11. (currently amended) An apparatus for use within a borehole penetrating an earth  
2 formation for ~~determining~~ estimating a parameter of interest of said earth  
3 formation, comprising:

- 4 (a) a nuclear radiation source for irradiating ~~said the~~ earth formation;
- 5 (b) a nuclear radiation detector spaced apart from said nuclear radiation source  
6 for making measurements ~~resulting from interaction of said irradiation~~  
7 ~~with said earth formation~~;
- 8 (c) a processor for which

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5

- 9 (i) ~~defining~~ defines a starting time for a processing time window ~~for~~  
10 at which said measurements made by the nuclear radiation detector  
11 are responsive primarily to said the parameter of interest; and
- 12 (ii) ~~defining~~ defines an ending time for said the processing time  
13 window for at which said the measurements made by the nuclear  
14 radiation detector are substantially uncontaminated by noise.

15

1 12. (currently amended) The apparatus of claim 11, wherein said the processor defines  
2 said the starting time by determining a time at which a value of said the  
3 measurements has a predetermined relation to a determined value of a parameter  
4 of interest at an ending time of a processing time window for an earlier operation  
5 of said the nuclear radiation source.

6

1 13. (currently amended) The apparatus of claim 12 wherein said the processor further  
2 analyzes said the measurements within said processing time window and  
3 determines said the parameter of interest.

4

1 14. (currently amended) The apparatus of claim 12, wherein said the nuclear radiation  
2 source further comprises a pulsed neutron source.

3

1 15. (currently amended) The apparatus of claim 14, wherein said the measurements  
2 made by the nuclear radiation detector further comprise gamma ray

3 measurements.

4

1 16. (currently amended) The apparatus of claim 14, wherein ~~said~~ the parameter of  
2 interest ~~further~~ comprises at least one of (i) a thermal neutron capture cross  
3 section of said the earth formation, (ii) porosity, (iii) formation water salinity, and  
4 (iv) the quantity and type of hydrocarbons contained in pore spaces. [0005]

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1 17. (currently amended) The apparatus of claim 12, wherein said predetermined  
2 relation is of the form

3 
$$istr = K / \Sigma$$

4 where *istr* is the start time of a window, *K* is a constant, and  $\Sigma$  is a capture cross  
5 section at said the ending time of said the processing time window for said the  
6 earlier pulsing operation of said the nuclear radiation source.

7

1 18. (currently amended) The apparatus of claim 11 wherein ~~said~~ the processor defines  
2 said the ending time based on forming a running sum of count rates starting at  
3 said the starting time.

4

1 19. (original) The apparatus of claim 18, wherein processor defines said ending based  
2 on forming a running sum of count rates starting at said starting time.

3

1 20. (original) The method of claim 19, wherein said processor defines said ending

2 time based on determining a time at which a count rate has a predetermined  
3 relation to said running sum.

4  
1 21. (currently amended) A system for ~~estimating determining~~ a parameter of interest  
2 from an earth formation, comprising:

3 (a) a ~~logging~~ tool including:

4 (i) a nuclear radiation source ~~for irradiating said earth formation,~~

5 (ii) at least one nuclear radiation detector spaced apart from said  
6 nuclear radiation source ~~for making measurements resulting from~~  
7 ~~interaction of said irradiation with said earth formation;~~

8 (b) a ~~processing unit~~ processor ~~for~~ defining a starting time and an ending time  
9 ~~for of~~ a time window ~~of~~ for analysis of said measurements made by the  
10 nuclear radiation detector, wherein said measurements are responsive  
11 primarily to said parameter of interest at said starting time and are  
12 substantially uncontaminated by noise at said ending time.

13

1 22. (original) The system of claim 21, wherein said processor defines said start time  
2 based on a a time at which a value of said measurements have a predetermined  
3 relation to a determined value of a parameter of interest at an ending time of a  
4 processing time window for an earlier operation of said source.

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1 23. (currently amended) The system of claim 22 21, wherein ~~said the nuclear radiation~~

2 source further comprises a pulsed neutron source.

3

1 24. (currently amended) The system of claim ~~22~~ 21, wherein said measurements made  
2 by the nuclear radiation detector further comprise gamma ray measurements.

3

1 25. (currently amended) The system of claim 22, wherein said the parameter of  
2 interest ~~further~~ comprises at least one of (i) a thermal neutron capture cross  
3 section of said the earth formation, (ii) porosity, (iii) formation water salinity, and,  
4 (iv) the quantity and type of hydrocarbons contained in pore spaces.

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1 26. (currently amended) The system of claim 22, wherein said predetermined relation  
2 is of the form

3 
$$istr = K / \Sigma$$

4 where *istr* is the start time of a window, *K* is a constant, and  $\Sigma$  is a capture cross  
5 section at said the ending time of said the processing time window for said earlier  
6 pulsing operation of said source.

7

1 27. (original) The system of claim 21, wherein said processor determines said ending  
2 time based on forming a running sum of count rates starting at said starting time.

3

1 28. (original) The system of claim 27, wherein said processor determines said ending  
2 time based on determining a time at which a count rate has a predetermined

3 relation to said running sum.

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1 29. (new) The system of claim 21 further comprising a conveyance device which  
2 conveys the tool into a borehole in the earth formation.

3

1 30. (new) The system of claim 21 wherein the conveyance device is one of (i) a  
2 wireline, (ii) coiled tubing.

3

1 31. (new) The system of claim 21 further comprising a channel number generator  
2 which produces a numerical sequence of memory address codes corresponding to  
3 a sequence of adjacent time windows.

4

1 32. (new) The system of claim 21 further comprising a mass storage unit associated  
2 with the processor.

3

1 33. (new) The system of claim 31 further comprising a spectrum accumulator.

2

1 34. (new) The system of claim 30 wherein the conveyance device comprises a  
2 wireline, the system further comprising a depth controller which provides signals  
3 indicative of a depth of said tool.

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